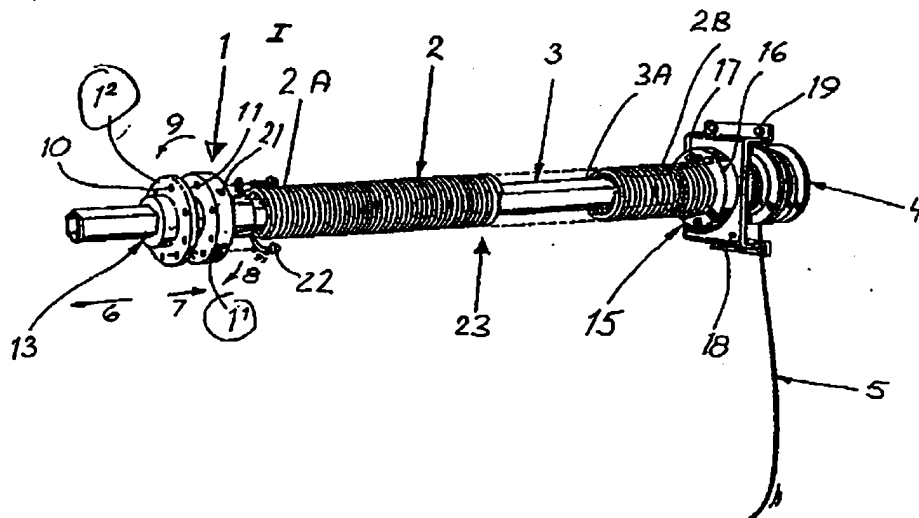


**PCT**WORLD INTELLECTUAL PROPERTY ORGANIZATION  
International Bureau

## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>5</sup>:</b>  <b>E05D 13/00, E05F 1/08</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 90/15216</b>  <b>(43) International Publication Date:</b> 13 December 1990 (13.12.90)
<b>(21) International Application Number:</b> PCT/SE90/00364 <b>(22) International Filing Date:</b> 30 May 1990 (30.05.90)  <b>(30) Priority data:</b> 8901932-7                      30 May 1989 (30.05.89)                      SE  <b>(71) Applicant (for all designated States except US):</b> CRAWFORD DOOR AB [SE/SE]; Box 160, S-423 21 Torslanda (SE).  <b>(72) Inventor; and</b> <b>(75) Inventor/Applicant (for US only):</b> BENGTSSON, Fred [SE/SE]; Kyrkås Trappor 3, S-433 31 Partille (SE).  <b>(74) Agent:</b> AWAPATENT AB; Box 53252, S-400 16 Göteborg (SE).		<b>(81) Designated States:</b> AT, AT (European patent), AU, BB, BE (European patent), BF (OAPI patent), BG, BJ (OAPI patent), BR, CA, CF (OAPI patent), CG (OAPI patent), CH, CH (European patent), CM (OAPI patent), DE*, DE (European patent)*, DK, DK (European patent), ES, ES (European patent), FI, FR (European patent), GA (OAPI patent), GB, GB (European patent), HU, IT (European patent), JP, KP, KR, LK, LU, LU (European patent), MC, MG, ML (OAPI patent), MR (OAPI patent), MW, NL, NL (European patent), NO, RO, SD, SE, SE (European patent), SN (OAPI patent), SU, TD (OAPI patent), TG (OAPI patent), US.  <b>Published</b> <i>With international search report.</i> <i>With amended claims.</i>

**(54) Title:** A SPRING ATTACHMENT MEMBER**(57) Abstract**

A spring attachment member (1) for securement of a door balancing spring (2) which is coiled about a shaft (3). In accordance with the invention at least one (2A) of the ends of the spring (2) is arranged to be secured to a two-piece attachment (1) enclosing the spring mounting shaft (3). One attachment member part (11) is slidable in the lengthwise direction (6-7) as well as being arranged to turn (8-9) about said shaft (3). The second, complementary attachment member part (12) is arranged for sliding movement in the lengthwise direction (6-7) of the shaft (3) but is non-rotationally mounted thereon. The two attachment member parts (11, 12) are arranged to be securely interconnected.



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A SPRING ATTACHMENT MEMBER

The present invention concerns a spring attachment member for securement of a door balancing spring which is coiled about a shaft.

The main purpose of the present invention is primarily to provide a spring attachment member which is arranged in such a manner as to allow the door balancing torsional spring/springs to be tensioned upon downwards movements (closing) of the door.

This purpose is achieved in accordance with the invention with the aid of a spring attachment member which is characterized in that at least one of the ends of the spring is arranged to be secured to a split two-piece spring attachment member enclosing the spring shaft, one attachment member part being slidable in the lengthwise direction of the shaft as well as being arranged to turn about said shaft, and in that the second, complementary attachment member part is arranged for sliding movement in the lengthwise direction of the shaft but is non-rotationally mounted thereon, said two attachment member parts arranged to be securely interconnected.

One preferred embodiment of the invention will be described in closer detail in the following with reference to the accompanying drawings, wherein

Fig. 1 shows a spring attachment member and the associated spring in a disconnected, pre-assembly position.

Fig. 2 illustrates the spring attachment member in the tightened assembly position, and

Fig. 3 illustrates the attachment member in its fully mounted position, the alternative displaced position of the attachment member being shown in broken lines.

The subject invention concerns a spring attachment

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member 1 for a door balancing spring 2 which is coiled about its associated door spring shaft 3, one end 3A of said spring being non-rotationally secured to a cable drum 4 on which drum 4 is wound a cable 5 which is attached to a door. The door is guided for movement along tracks extending alongside the opening to be closed by the door.

In accordance with the teachings of the invention one end 2A of the spring 2 which preferably is of the helically wound type, is arranged to be attached to a split, two-piece spring attachment member 1 which encloses the spring shaft 3. One attachment member part 1<sup>1</sup> of the attachment member 1, which part is intended to be attached to the spring 2 and to be positioned next to said spring, is mounted on the shaft 3 in such a manner as to be displaceable along said shaft 3 in the directions indicated by arrows 6, 7. In addition, this attachment member part 1<sup>1</sup> is mounted for rotational movement about the shaft 3 in the direction indicated by arrows 8-9.

The second complementary attachment part 1<sup>2</sup> of the two-piece attachment member 1 is mounted on the shaft 3 for movement in the longitudinal directions thereof indicated by arrows 6-7. However, this second attachment member part 1<sup>2</sup> is non-rotationally attached to the shaft 3 and consequently these two components turn together as one single unit.

In accordance with the teachings of the invention the two attachment member parts are interconnectable, for example by means of non-threaded through-holes 10 formed in e.g. the second attachment member part 1<sup>2</sup> and threaded holes 11 formed in the other attachment member part 1<sup>1</sup>, and by means of threaded attachment bolts 12 arranged to be received in the respective holes 10, 11 so as to form an integrated spring attachment member 1 which is non-rotationally secured to the spring shaft 3 but displaceable in the longitudinal directions

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6-7 of the shaft 3.

Preferably, the two attachment member parts 1<sup>1</sup>, 1<sup>2</sup> are disc-shaped, presenting e.g. a circular circumferential configuration, with the first attachment member part 1<sup>1</sup> having a circular central opening to allow free rotational movement of said attachment part in coupling position I around the spring shaft 3 whereas the second attachment member part 1<sup>2</sup> has a central opening 13 of irregular configuration in order to be turned together with and by said spring shaft 3. Preferably, the central opening 13 of said second attachment member part 1<sup>2</sup> has a circumferential configuration which essentially matches the shape of the spring shaft 3. The spring shaft 3 may for instance have a non-round configuration or a polygonal circumferential configuration, such as a hexagonal shape, in which case the central opening 13 has a configuration matching that of the spring shaft 3, i.e. the central opening 13 has a congruent hexagonal configuration.

The hub portion 14 of the first attachment member part 1<sup>1</sup> is arranged to receive a bearing means of complementary configuration projecting in axial direction from the second attachment member part 1<sup>2</sup>.

The second end 2B of the spring 2 may be attached to a similar attachment member to that described in the foregoing or to a conventional attachment member 15, for instance of the kind illustrated in the drawing figures and comprising a disc-shaped attachment member part 16 to which the spring 2 is secured by means of a screw 17 and which attachment part 16 is arranged for securement in a wall-mounted bracket 18 which by means of screws 19 is fastened to the intended mounting place.

Attachment member part 1<sup>1</sup> of the intended two-piece spring attachment member 1 is formed with reception means 21 designed in conformity with a manually actuatable turning element 20. The reception means may be e.g.

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a number of apertures 21 adapted to receive one end 20A of a lever 20. Preferably, a plurality of lever receiving apertures 21 are distributed along the circumference of the associated attachment member part 1<sup>1</sup>.

5 Finally, the spring 2 is secured to the attachment member part 1<sup>1</sup> by means of a bolt joint 22.

How the spring attachment member in accordance with the invention functions should be apparent from the foregoing and from a study of the drawings. Briefly,  
10 the entire spring unit 23 is lifted as one single piece to the intended position of use to be secured in that position by means of screws. At this stage the spring 2 is in its untensioned, unloaded coupling position I, in which its one spring end 2A is attached to the attachment member part 1<sup>1</sup>.  
15 By means of the lever 20 said attachment member part 1<sup>1</sup> is turned in the rotational direction 9 to tension the spring 2 in such a manner that the latter obtains the correct desired spring tension, whereupon the attachment member part 1<sup>1</sup> and the second attachment part 1<sup>2</sup> are jointed together by means of screws,  
20 said second attachment member part being rotated together with the spring mounting shaft 3 which is interconnected with the wire drum 4. Consequently, the spring 2 need not be tightened before the door hoisting cable 5 is  
25 secured to the door in its intended position.

In the interconnected position II of the attachment member 1 the latter is freely displaceable in the horizontal directions 6-7 in dependence on the amount of extension and contraction, respectively, of the spring 2  
30 in the various setting positions thereof.

The invention is not limited to the embodiments described in the foregoing and illustrated in the drawings but various modifications are possible within the scope of the appended claims.

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# CLAIMS

1. A spring attachment member (1) for securing a door balancing spring (2) which is coiled about a shaft (3), c h a r a c t e r i z e d in that at least one (2A) of the ends of the spring (2) is arranged to  
5 be secured to a split, two-piece spring attachment member (1) enclosing the spring shaft (3), one attachment member part (1<sup>1</sup>) being slidable in the lengthwise direction (6-7) of the shaft as well as being arranged to turn (8-9) about said shaft (3), and in that the second,  
10 complementary attachment member part (1<sup>2</sup>) is arranged for sliding movement in the lengthwise direction (6-7) of the shaft (3) but is non-rotationally mounted thereon, said two attachment member parts (1<sup>1</sup>, 1<sup>2</sup>) arranged to be securely interconnected.

15 2. A spring attachment member as claimed in claim 1, c h a r a c t e r i z e d in that the attachment member parts (1<sup>1</sup>, 1<sup>2</sup>) are disc-shaped, one (1<sup>1</sup>) of said attachment member parts having a circular hub opening whereas the second attachment member part (1<sup>2</sup>) is formed  
20 with a central opening (13) of irregular configuration.

3. A spring attachment member as claimed in claim 2, wherein said spring shaft (3) has a polygonal peripheral configuration, e.g. a hexagonal configuration, c h a -  
r a c t e r i z e d in that the central opening (13)  
25 of said second attachment member part (1<sup>2</sup>) has a peripheral configuration matching that of the spring shaft (3).

4. A spring attachment member as claimed in any one of the preceding claims, c h a r a c t e r i z e d  
30 therein that the central portion (14) of said first attachment member part (1<sup>1</sup>) is arranged to be fitted onto a bearing means of complementary configuration projecting in the axial direction (7) from said second attachment member part (1<sup>2</sup>).

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5. A spring attachment member as claimed in any one of the preceding claims, characterized therein that the two attachment member parts (1<sup>1</sup>, 1<sup>2</sup>) are formed respectively with a through-hole (10) and  
5 with a threaded hole (11) for reception in said holes of attachment bolts (12) serving to join the two attachment member parts (1<sup>1</sup>, 1<sup>2</sup>) together for the purpose of forming an attachment member (1) which is non-rotationally secured to the spring shaft (3) but may be  
10 displaced in the longitudinal direction (6, 7) of said shaft.

6. A spring attachment member as claimed in any one of the preceding claims, characterized therein that the first attachment member part (1<sup>1</sup>) is  
15 formed with reception means (21) designed in conformity with a manually actuatable turning element (20), said reception means (21) being e.g. a number of apertures (21) adapted for reception therein of a lever (20).

7. A spring attachment member as claimed in claim 6,  
20 characterized in that a plurality of lever reception apertures (21) are distributed along the circumference of the first attachment member part (1<sup>1</sup>).

8. A spring attachment member as claimed in any one of the preceding claims, characterized  
25 therein that a bolt joint (22) secures the spring (2) to the first attachment member part (1<sup>1</sup>).



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AMENDED CLAIMS

[received by the International Bureau  
on 19 October 1990 (19.10.90);  
original claim 1 amended; other claims unchanged  
(2 pages)]

1. A spring attachment member (1) for securing  
a door balancing spring (2) of the helically wound type  
through which passes a shaft (3), said spring attach-  
ment member arranged to non-rotationally secure one  
5 spring end to said shaft, c h a r a c t e r i z e d  
in that it comprises two releasably interconnected  
parts, one part (1<sup>1</sup>) of which is rotational relative  
to the shaft but non-rotational relative to said spring  
end whereas the second part (1<sup>2</sup>) which is interconnectable  
10 with the first part, is non-rotationally but at the  
same time slidably mounted on the shaft (3) in such  
a manner that the end attachment (1), in its assembled  
condition, is free to move axially, also under conditions  
of spring (2) activity, while being guided by said shaft,  
15 whereas the attachment member part attached to the spring,  
when disconnected from the other part, may be turned  
relative to the shaft and bring along said spring end  
in its turning movement until attainment of the desired  
spring tension relative to said shaft, whereupon it  
20 is locked in that position by mutual interconnection  
of that two spring attachment member parts.

2. A spring attachment member as claimed in claim  
1, c h a r a c t e r i z e d in that the attachment  
member parts (1<sup>1</sup>, 1<sup>2</sup>) are disc-shaped, one (1<sup>1</sup>) of said  
25 attachment member parts having a circular hub opening  
whereas the second attachment member part (1<sup>2</sup>) is formed  
with a central opening (13) of irregular configuration.

3. A spring attachment member as claimed in claim 2,  
wherein said spring shaft (3) has a polygonal peripheral  
30 configuration, e.g. a hexagonal configuration, c h a -  
r a c t e r i z e d in that the central opening (13)  
of said second attachment member part (1<sup>2</sup>) has a peri-  
pheral configuration matching that of the spring shaft (3).

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4. A spring attachment member as claimed in any one of the preceding claims, characterized therein that the central portion (14) of said first attachment member part (1<sup>1</sup>) is arranged to be fitted  
5 onto a bearing means of complementary configuration projecting in the axial direction (7) from said second attachment member part (1<sup>2</sup>).

5. A spring attachment member as claimed in any one of the preceding claims, characterized  
10 therein that the two attachment member parts (1<sup>1</sup>, 1<sup>2</sup>) are formed respectively with a through-hole (10) and with a threaded hole (11) for reception in said holes of attachment bolts (12) serving to join the two attachment member parts (1<sup>1</sup>, 1<sup>2</sup>) together for the purpose  
15 of forming an attachment member (1) which is non-rotationally secured to the spring shaft (3) but may be displaced in the longitudinal direction (6, 7) of said shaft.

6. A spring attachment member as claimed in any  
20 one of the preceding claims, characterized therein that the first attachment member part (1<sup>1</sup>) is formed with reception means (21) designed in conformity with a manually actuatable turning element (20), said reception means (21) being e.g. a number of apertures  
25 (21) adapted for reception therein of a lever (20).

7. A spring attachment member as claimed in claim 6, characterized in that a plurality of lever reception apertures (21) are distributed along the circumference of the first attachment member part (1<sup>1</sup>).

30 8. A spring attachment member as claimed in any one of the preceding claims, characterized therein that a bolt joint (22) secures the spring (2) to the first attachment member part (1<sup>1</sup>).

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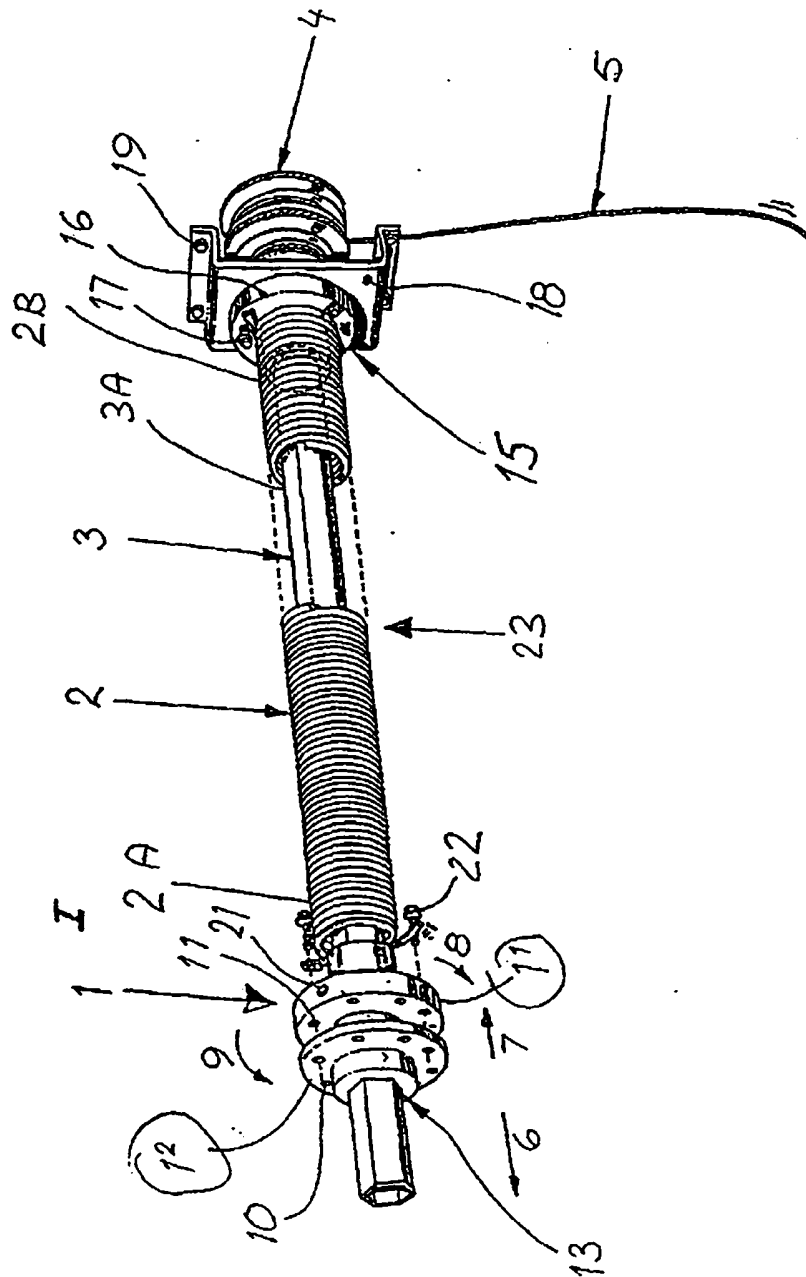


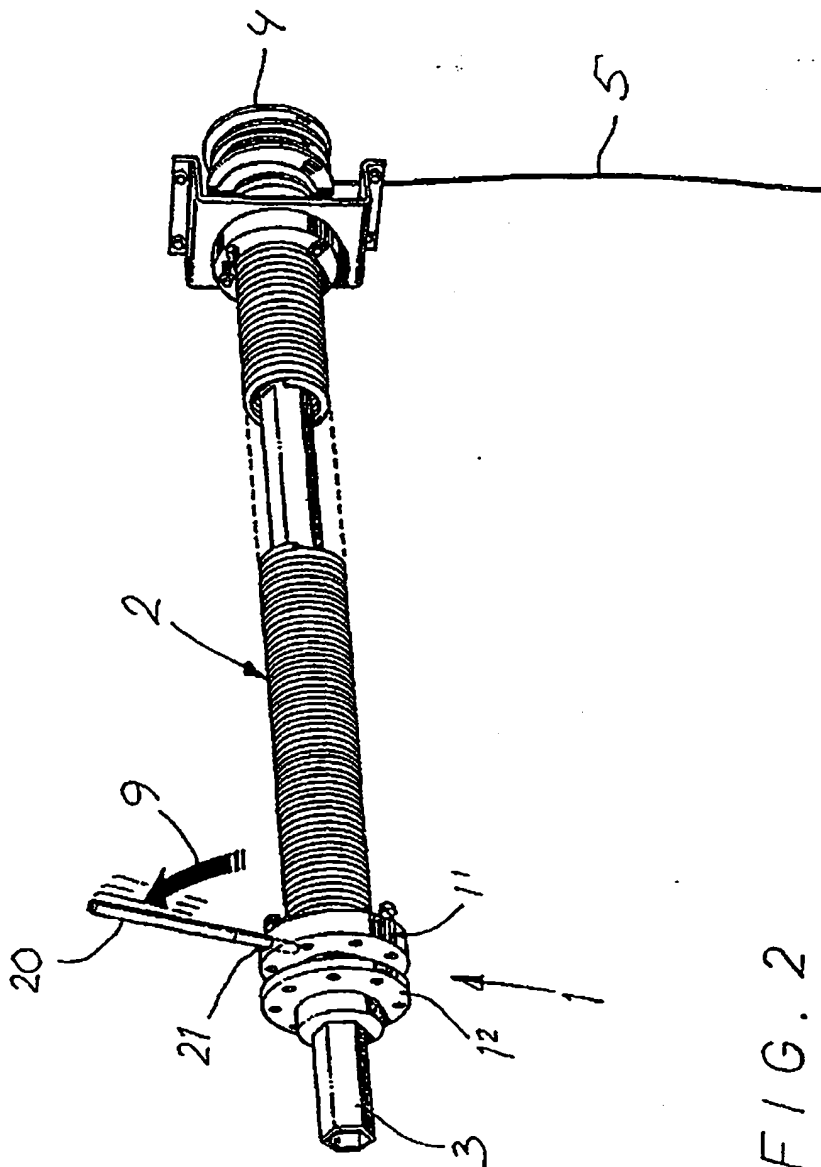
FIG. 1

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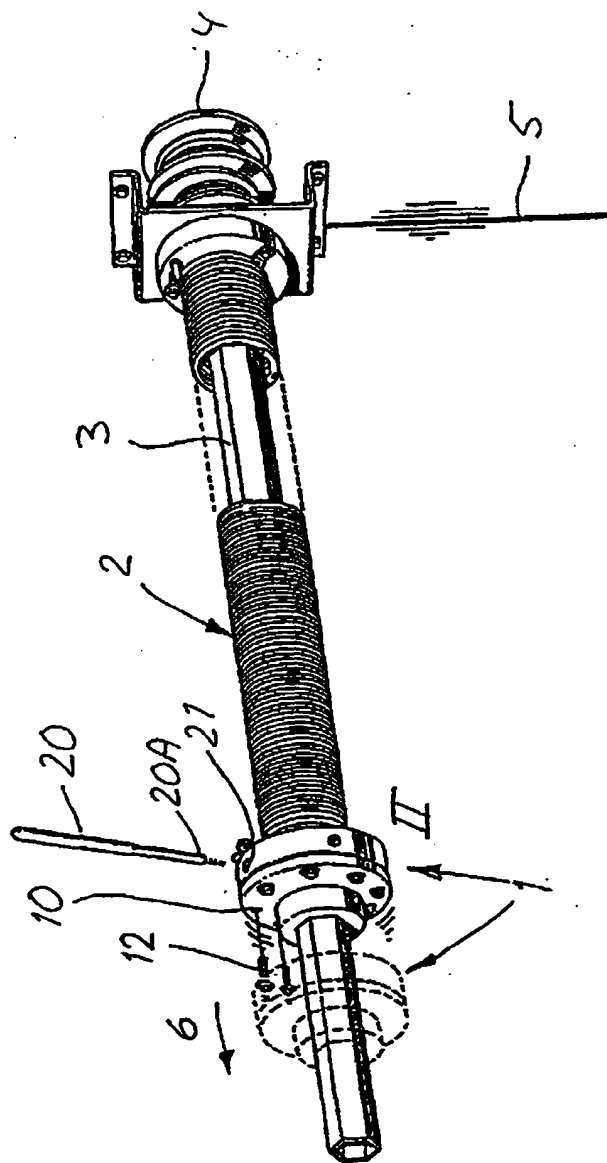


FIG. 3

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## INTERNATIONAL SEARCH REPORT

International Application No PCT/SE 90/00364

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (If several classification symbols apply, indicate all) <sup>1</sup>		
According to International Patent Classification (IPC) or to both National Classification and IPC		
IPC5: E 05 D 13/00, E 05 F 1/08		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched <sup>2</sup>		
Classification System	Classification Symbols	
IPC5	E 05 D; E 05 F	
Documentation Searched other than Minimum Documentation to the extent that such Documents are included in Fields Searched <sup>3</sup>		
SE,DK,FI,NO classes as above		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT<sup>4</sup></b>		
Category <sup>5</sup>	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
X	US, A, 1922370 (C.G. JOHNSON ET AL) 15 August 1933, see the whole document	1,5-8
Y	---	2-5
Y	SE, C, 186196 (E A FORS ET AL) 12 November 1963, see the whole document	2-5
Y	US, A, 3635277 (BAHNSEN) 18 January 1972, see the whole document	2-5
Y	US, A, 2097242 (D.M. ROBINSON) 26 October 1937, see the whole document	2-5
-----		
<p><sup>10</sup> Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"Z" document member of the same patent family</p>		
<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search		Date of Mailing of this International Search Report
6th August 1990		1990 -08- 24
International Searching Authority SWEDISH PATENT OFFICE		Signature of Authorized Officer Christer Wendtius

Form PCT/ISA/210 (second sheet) (January 1985)

**ANNEX TO THE INTERNATIONAL SEARCH REPORT  
ON INTERNATIONAL PATENT APPLICATION NO.PCT/SE 90/00364**

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the Swedish Patent Office EDP file on 90-06-27. The Swedish Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 1922370	33-08-15	NONE	
SE- - 186196	63-11-12	NONE	
US-A- 3635277	72-01-18	NONE	
US-A- 2097242	37-10-26	NONE	